of occlusion of an intraocular vessel has occurred with a periorbital injection.

The long-term results of collagen injections to correct contour deformity vary with the type of lesion, tissue stress and unknown factors related to collagen turnover. Patients are advised that the permanence of the correction cannot be predicted and that some subsidence will occur. Supplemental injections may be required to maintain adequacy of results; however, good results without reinjection have occurred in a significant number of patients for as long as two to four years.

HALE TOLLETH, MD

REFERENCES

Kaplan EN, Falces E, Tolleth H: Clinical utilization of injectable collagen. Ann Plast Surg 1983 Jun; 10:437-451

Knapp TR, Kaplan EN, Daniels JR: Injectable collagen for soft tissue augmentation. Plast Reconstr Surg 1977 Sep; 60:398-405

Stegman SJ, Tromovitch TA: Implantation of collagen for depressed scars. J Dermatol Surg Oncol 1980 Jun; 6:450-453

Refinements in Tissue Expansion

TISSUE EXPANSION represents a physiologic phenomenon that emphasizes the principle that tissue can accommodate to a slowly enlarging mass by increasing its surface area. Developmental expansion of breast tissue or the cyclical enlargement of abdominal girth by a growing fetus are pertinent examples of natural tissue expansion.

"Controlled" tissue expansion was popularized by the innovative developments, begun by Dr Chedomir Radovan in 1976, for adjacent flaps in breast reconstruction. Since then, the use of tissue expansion in reconstructive surgery has sharply widened in both clinical and research areas.

Tissue expansion is a two-staged technique initiated by placing a temporary expandable silicone implant beneath normal tissue, usually adjacent but, on occasion, distant to a defect. As the silastic balloon is enlarged by the incremental addition of sterile saline, the overlying tissue gently "expands" and is available for use after implant removal. Tissue expansion should be considered an *aesthetic* alternative in reconstructive surgical procedures, specifically in those areas where previous techniques have not provided consistent aesthetic or functional results. Because of its versatility, safety and simplicity, tissue expansion may be better tolerated in patients where more sophisticated and complicated procedures may prove to be a substantial challenge to the patient's problem.

Advantages

- Minimal donor defect.
- Provides "like" characteristics, such as color, sensation, hair.
- Provides highly vascularized tissue—that is, delay phenomenon.
- Simple, reliable, safe and versatile.

Clinical Usage

- Head and neck reconstruction—that is, scalp, nose, external ear, mandible, congenital nevi and hemangiomas, traumatic and cosmetic defects and burn contractures.
- Breast reconstruction for Poland's syndrome, postmastectomy.
- Trunk and perineal reconstruction for burn contracture, abdominal wall defects, pressure sores and the like.
- Extremity reconstruction for pressure sores, traumatic defects and so forth.

Preventing complications remains the key to reducing the rates of major and minor complications. These include proper patient and defect selection, refining operative techniques and improved product modification. The common complications of tissue expansion include exposure or deflation of implant and valve, infection, skin necrosis, compression of adjacent structures and hematoma or seroma.

With any innovative reconstructive procedure, a period of enthusiasm is followed by a period of reflection and refinements. The concept and practice of tissue expansion is currently in the latter period of evolution. Its ultimate role in reconstruction will be determined by increased clinical experience and the ingenuity of surgeons.

GORDON H. SASAKI, MD

REFERENCES

Grabb WC: Breast reconstruction after mastectomy using the temporary expander (Discussion). Plast Reconstr Surg 1982 Feb; 69:207-208

Radovan C: Breast reconstruction after mastectomy using the temporary expander. Plast Reconstr Surg 1982 Feb; 69:195-206

Sasaki GH, Pang CY: Functional blood flow and skin viability in random skin flaps constructed on expanded skin in pigs: Delay phenomena in action. Plast Reconstr Surg 1984; 74:59-65

Biobrane—A Synthetic Skin Substitute

THE DEVELOPMENT of an artificial skin to replace burn-damaged skin has been a long-held hope. Recent publications in the lay press have brought this research to the attention of the general public and have raised its expectations.

A truly artificial skin would ideally be a *permanent* substitute for a patient's own skin and, as such, should share with skin the characteristics of a protective barrier against bacterial invasion and water, protein and heat loss. The ideal artificial skin would also be flexible, sterile with a long shelf life, low in cost and readily available. In the recent past and at present, the best skin substitutes have been biologic dressings such as amnion and human cadaver allograft. These are expensive, however, must be changed frequently and are not permanent, requiring eventual replacement with autograft.

A commercially available synthetic skin substitute, Biobrane, has been widely used on burned patients as a temporary skin replacement. It has served as a low-cost alternative to human cadaver allograft. The barrier properties of Biobrane are similar to human skin; it is able to withstand bacterial wound contamination as well as fresh human cadaver allograft and is transparent, allowing visualization of the underlying wound.